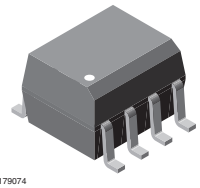
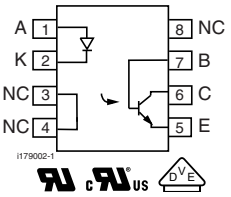
Optocoupler, Phototransistor Output, with Base Connection in SOIC-8 Package





FEATURES

- High BV_{CEO}, 70 V
- Isolation test voltage, 4000 V_{RMS}
- Compliant to RoHS Directive 2002/95/EC and in accordance to WEEE 2002/96/EC

Pb-free

e3

RoHS COMPLIANT

AGENCY APPROVALS

- UL1577, file no. E52744 system code Y
- cUL - file no. E52744, equivalent to CSA bulletin 5A
- DIN EN 60747-5-2 (VDE 0884) available with option 1

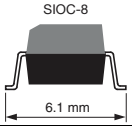
DESCRIPTION

The VO205AT, VO206AT, VO207AT, VO208AT are optically coupled pairs with a gallium arsenide infrared LED and a silicon NPN phototransistor. Signal information, including a DC level, can be transmitted by the device while maintaining a high degree of electrical isolation between input and output. This family comes in a standard SOIC-8A small outline package for surface mounting which makes them ideally suited for high density application with limited space.

ORDERING INFORMATION

V	O	2	0	#	A	T

PART NUMBER



AGENCY CERTIFIED/PACKAGE	CTR (%)			
UL, cUL, VDE	40 to 80	63 to 125	100 to 200	160 to 320
SOIC-8	VO205AT	VO206AT	VO207AT	VO208AT

ABSOLUTE MAXIMUM RATINGS (T_{amb} = 25 °C, unless otherwise specified)

PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
INPUT				
Peak reverse voltage		V_R	6	V
Forward continuous current		I_F	60	mA
Peak forward current	1 µs, 300 pps	I_{FM}	1	A
Power dissipation		P_{diss}	90	mW
Derate linearly from 25 °C			1.2	mW/°C
OUTPUT				
Collector emitter breakdown voltage		BV_{CEO}	70	V
Emitter collector breakdown voltage		BV_{ECO}	7	V
Collector-base breakdown voltage		BV_{CBO}	70	V
$I_{Cmax.\ DC}$		$I_{Cmax.\ DC}$	50	mA
$I_{Cmax.}$	t < 1 ms	$I_{Cmax.}$	100	mA
Power dissipation		P_{diss}	150	mW
Derate linearly from 25 °C			2	mW/°C
COUPLER				
Isolation test voltage		V_{ISO}	4000	V_{RMS}
Total package dissipation (LED and detector)		P_{tot}	240	mW
Derate linearly from 25 °C			3.3	mW/°C
Operating temperature		T_{amb}	- 40 to + 100	°C
Storage temperature		T_{stg}	- 40 to + 150	°C
Soldering time	at 260 °C	T_{sld}	10	s

Note

- Stresses in excess of the absolute maximum ratings can cause permanent damage to the device. Functional operation of the device is not implied at these or any other conditions in excess of those given in the operational sections of this document. Exposure to absolute maximum ratings for extended periods of the time can adversely affect reliability.

ELECTRICAL CHARACTERISTCS (T_{amb} = 25 °C, unless otherwise specified)							
PARAMETER	**TEST CONDITION**	**PART**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
INPUT							
Forward voltage	I_F = 10 mA		V_F		1.3	1.5	V
Reverse current	V_R = 6 V		I_R		0.1	100	µA
Capacitance	V_R = 0 V		C_O		13		pF
OUTPUT							
Collector emitter breakdown voltage	I_C = 100 µA		BV_{CEO}	70			V
Emitter collector breakdown voltage	I_E = 10 µA		BV_{ECO}	7	10		V
Collector base breakdown voltage	I_C = 100 µA		BV_{CBO}	100			V
Collector base current			I_{CBO}			1	nA
Emitter base current			I_{EBO}			1	nA
Collector emitter leakage current	V_{CE} = 10 V		I_{CEO}		5	50	nA
Saturation voltage, collector emitter	I_C = 2 mA, I_F = 10 mA		V_{CEsat}			0.4	V
COUPLER							
Capacitance, input to output			C_{IO}		0.5		pF

Note

- Minimum and maximum values were tested requierements. Typical values are characteristics of the device and are the result of engineering evaluations. Typical values are for information only and are not part of the testing requirements.

CURRENT TRANSFER RATIO							
PARAMETER	**TEST CONDITION**	**PART**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
I_C/I_F	I_F = 10 mA, V_{CE} = 5 V	VO205AT	CTR	40		80	%
		VO206AT	CTR	63		125	%
		VO207AT	CTR	100		200	%
		VO208AT	CTR	160		320	%

SWITCHING CHARACTERISTICS							
PARAMETER	**TEST CONDITION**	**PART**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
Turn-on time	I_C = 2 mA, R_L = 100 Ω, V_{CC} = 10 V		t_{on}		3		µs
Turn-off time	I_C = 2 mA, R_L = 100 Ω, V_{CC} = 10 V		t_{off}		3		µs
Rise time	I_C = 2 mA, R_L = 100 Ω, V_{CC} = 10 V		t_r		3		µs
Fall time	I_C = 2 mA, R_L = 100 Ω, V_{CC} = 10 V		t_f		2		µs

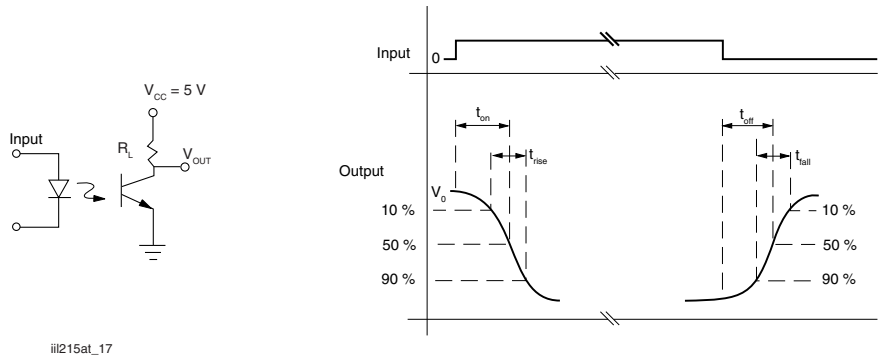


Fig. 1 - Switching Test Circuit

COMMON MODE TRANSIENT IMMUNITY						
PARAMETER	**TEST CONDITION**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
Common mode transient immunity at logic high	V_{CM} = 1000 V_{P-P}, R_L = 1 kΩ, I_F = 0 mA	$\|C_{MH}\|$		5000		V/µs
Common mode transient immunity at logic low	V_{CM} = 1000 V_{P-P}, R_L = 1 kΩ, I_F = 10 mA	$\|C_{ML}\|$		5000		V/µs

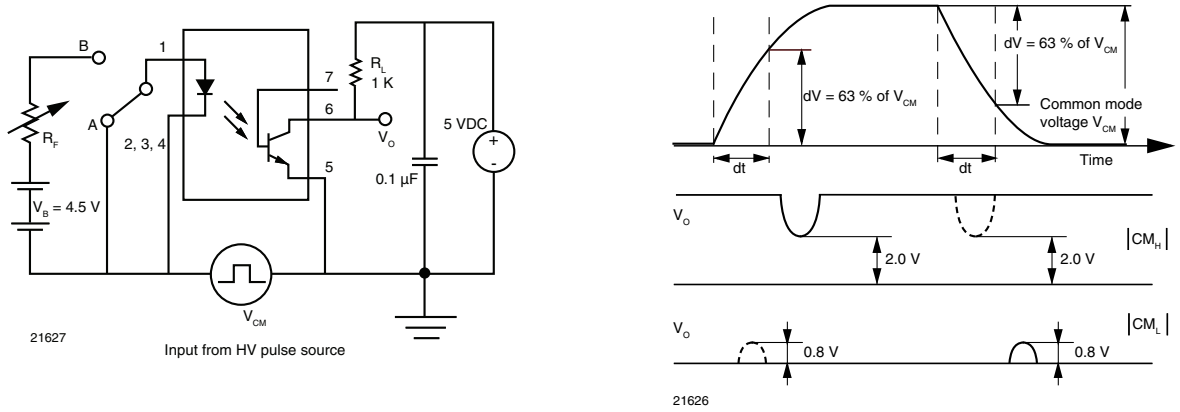


Fig. 2 - Test Circuit for Common Mode Transient Immunity

SAFETY AND INSULATION RATINGS						
PARAMETER	**TEST CONDITION**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
Climatic classification (according to IEC 68 part 1)				40/100/21		
Polution degree				2		
Comparative tracking index		CTI	175		399	
Isolation test voltage	1 s	V_{ISO}	4000			V_{RMS}
Peak transient overvoltage		V_{IOTM}	6000			V
Peak insulation voltage		V_{IORM}	560			V
Resistance (input to output)		R_{IO}		100		GΩ
Safety rating - power output		P_{SO}			350	mW
Safety rating - input current		I_{SI}			150	mA
Safety rating - temperature		T_{SI}			165	°C
External creepage distance			4			mm
External clearance distance			4			mm
Internal creepage distance			3.3			mm
Insulation thickness			0.2			mm

Note

- As per IEC 60747-5-5, §7.4.3.8.1, this optocoupler is suitable for “safe electrical insulation” only within the safety ratings. Compliance with the safety ratings shall be ensured by means of protective circuits.

TYPICAL CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)

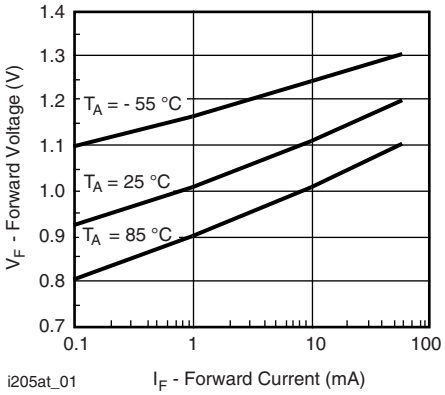


Fig. 3 - Forward Voltage vs. Forward Current

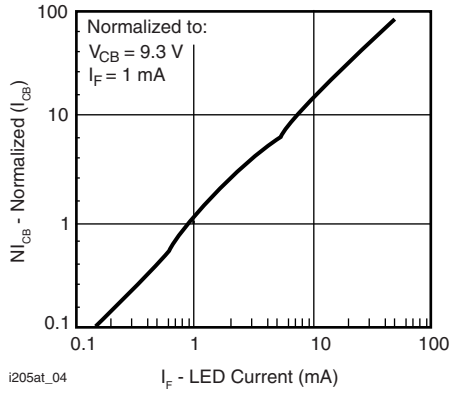


Fig. 6 - Normalized Collector-Base Photocurrent vs. LED Current

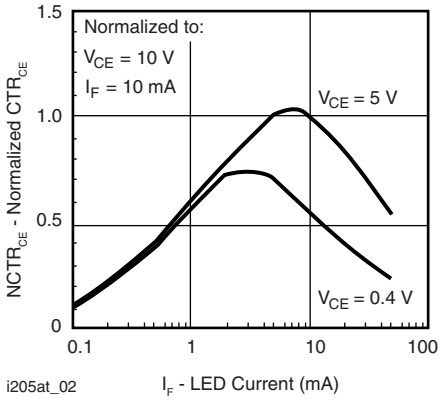


Fig. 4 - Normalized Non-Saturated and Saturated CTR_{CE} vs. LED Current

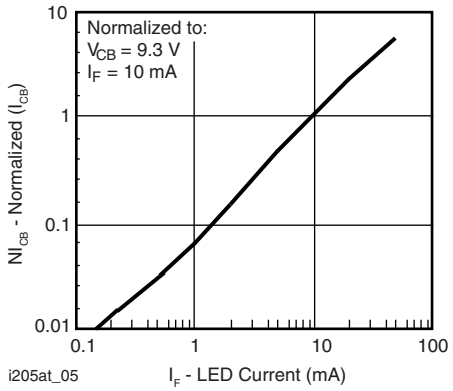


Fig. 7 - Normalized Collector-Base Photocurrent vs. LED Current

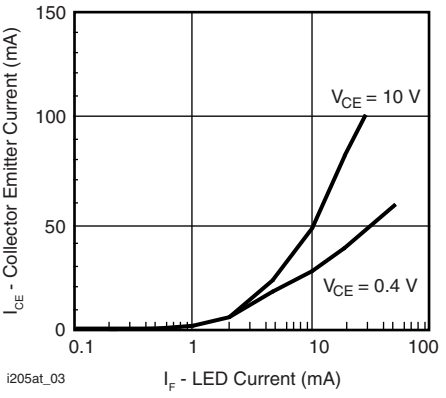


Fig. 5 - Collector Emitter Current vs. LED Current

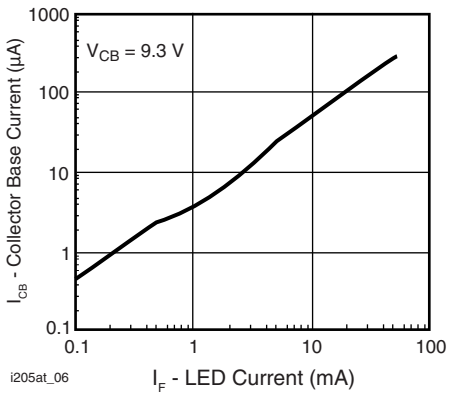
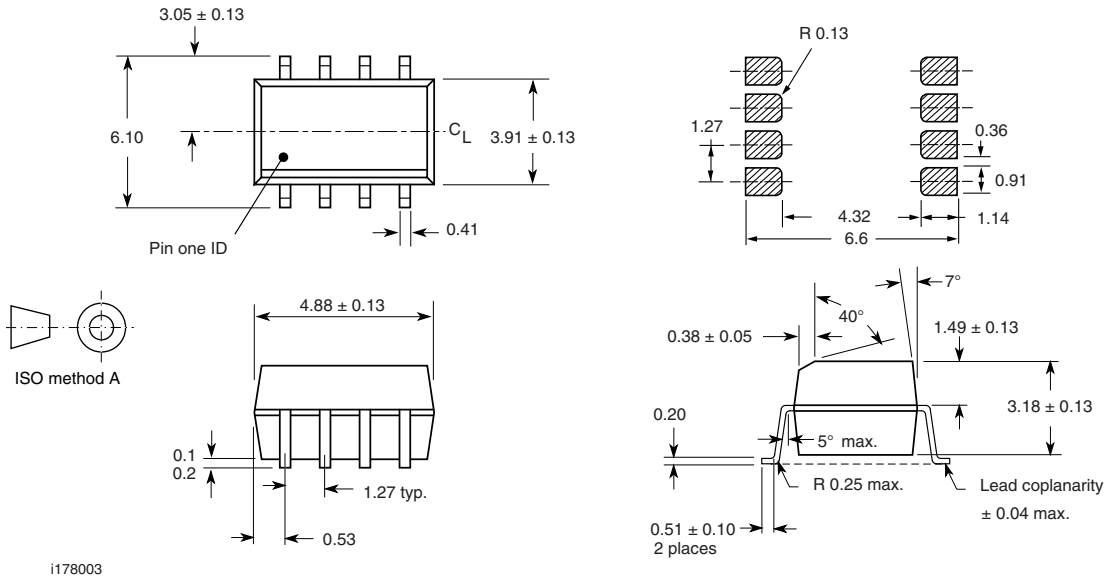


Fig. 8 - Collector Base Photocurrent vs. LED Current

PACKAGE DIMENSIONS in millimeters



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